

## Design Solutions for the Treatment of DMSD in the ISS Water Recovery System

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Dimethylsilanediol (DMSD) has been identified as a problematic organic on ISS. This contaminant was initially identified in the Water Processor Assembly (WPA) product water in 2010 by the Total Organic Carbon Analyzer (TOCA). DMSD is not a crew health hazard at the levels observed in the product water, but it may degrade the performance of the Oxygen Generation System (OGS) which uses the WPA product water for electrolysis and does impact the effective operation of the WPA catalytic reactor. To mitigate these impacts, early replacement of the Multifiltration Beds in the WPA is required. An investigation has determined that the decomposition of atmospheric polydimethylsiloxanes (PDMSs) is the primary source of DMSD in the condensate. PDMSs are prevalent on ISS from a variety of sources, including crew hygiene products, adhesives, caulks, lubricants, and various nonmetallics. These PDMSs also contribute to degradation of the CHX hydrophilic coating, rendering it hydrophobic and therefore affecting its ability to transmit water to the condensate bus. In addition, literature research has determined that PDMSs are likely oxidized to DMSD in the atmosphere when exposed to hydroxyl radicals in the ISS atmosphere. To address these mechanisms, filters have been developed for removal of PDMSs from the ISS atmosphere. However, ongoing analysis indicates a significant reduction in atmospheric PDMSs is required to achieve a measurable reduction of DMSD in the condensate. As a result, additional measures are being pursued to mitigate this issue. First, credible sources are being investigated to quantify to the extent possible the significant sources of PDMSs and identify sources that can be reasonably removed from ISS. Second, a Reverse Osmosis technology is being investigated as an alternate means for removing DMSD from the condensate. This paper summarizes the current status of the overall effort to mitigate DMSD in the US condensate.